UNITED STATES
DEPARTMENT OF THE INTERIOR

DI-6

APPROVED DECEMBER 1941

1955 - NTBA 5, Inyan Kara study #3

K.M. Waage

Contents.

doc. 468

In Denver — Mrs Henry Bell — [illegible] Mrs.
or June Uetermen (now married)
— for Robbins sections.
OK to take them back &
reproduce

Flying U Ranch
Newcastle, Wyoming

Edgemont area with Garland Gott (cont. from p 56, Ntbk 4, I-K 2)

has traced channel edge; it has a northwest trend. Sandstone is fine to medium grained.

Base Fall River seen at E, F ~~and G~~ similar to that in Devils tower area. Garland puts local channel sand directly under what I call base, in Fall River. This in same position as Henry Bells "Gould" ss. - will call it "Fuson sandst." here, it would be top Lakota, one ore-bearing in Carlile mine probably, in D.T. area.

Fall River - Fuson-Lakota contact.

Seen at E (picture) where it resembles the "red, white, & blue" contact of D.T. area. At some of road cuts we crossed zonation also evident, this was in Robinson Flats area. The Fe specks were present. At E the contact was within 2 or 3 feet of basal FR ss and a thin ss bed was on it locally.

Where the "Fuson sandstone" was present at F and H we discussed its position relative to the Fall River. At F there is no weathered zone and Fall River sits directly on the "Fuson ss".

1

Garlands interpretation is that this is a channel sand originating in the basal Fall River, whereas I interp. as a "Fuson", or post-Fuson sand truncated by Fall River plane of contact. At F the top surface is plane, but neither interp. can be eliminated. At H, however, the "Fuson ss" is still present but not completely occupying "Fuson" interval, and we found the weathered zone with red claystone beneath it resting on "Fuson" ss. I think this relationship favors my interp. esper. since Garland has mapped the ss in detail & shown it to be same as at F.

Suspect that the "contact" of Fall River & Fuson-Lakota will be found to hold in the southern Hills, but that it may be complicated to find locally because of Fall River (in my sense) channeling and more widespread presence of the "Fuson ss"

Saw contact in Henry Bell's Flint Hill quad. but had difficulty with it where his "Gould" ss was present. Here the grey

Fall River sh + thin interc. ss sat right on x-bedded to massive x-lam "Gould" with top "Gould" loc. Fe impreg. - but about a mile away found good red white + blue zone where "Gould" didn't come up as high in section.

"Fuson ss." - This lenticular unit locally distributed, is locally ore-bearing. It is the only unit in what I would call their Lakota (= Fuson + Lak) which has course to coltic ss similar to that in D.T. area. The basal cgl of this unit at locality H has an excellent basal cgl made up of frags + chunks + rounded pebbles of underlying beds (ss + clstn) chert + qtzt. granules and a few polished pebbles. Also found some polished pebbles in float from red clstns above the ss at locality H.

"Fuson" This would be from Fall River contact - which Gayland puts same place I would except where "Fuson ss"

See dr. 11/5

JURASSIC PARKING

Y.P.S.

occurs to the Minnewaste, which is locally present in Edgemont NE. Saw it at G, where it is sandy, and again at place to W off map where it was more typical. Where no Minnewaste Fuson bottoms on first "white massive" sandstone. At G the Fuson chiefly claystone had big silic. tree trunk, foss. wood all over. Saw several polished pebbles in float, colored clsts as in D.T. area and some of those thin white sugary sands also common in D.T. area.

Lakota. In Garlands quad the Lakota can be subdivided with rather good consistancy to its parts, but this doesn't apply outside his quad.

At top are massive white ss. Locally 2 beds, below this a lacustrine section of even-bedded ss, clsty, sh & some very limy beds. The clsts have ostracods & charophytes. (Loc. G - picture) Below this is thick ss., fine or massive brown weath commonly

broken by bench in middle, looks like the massive Fall River sands. It is ss most of Indian pictographs are on.

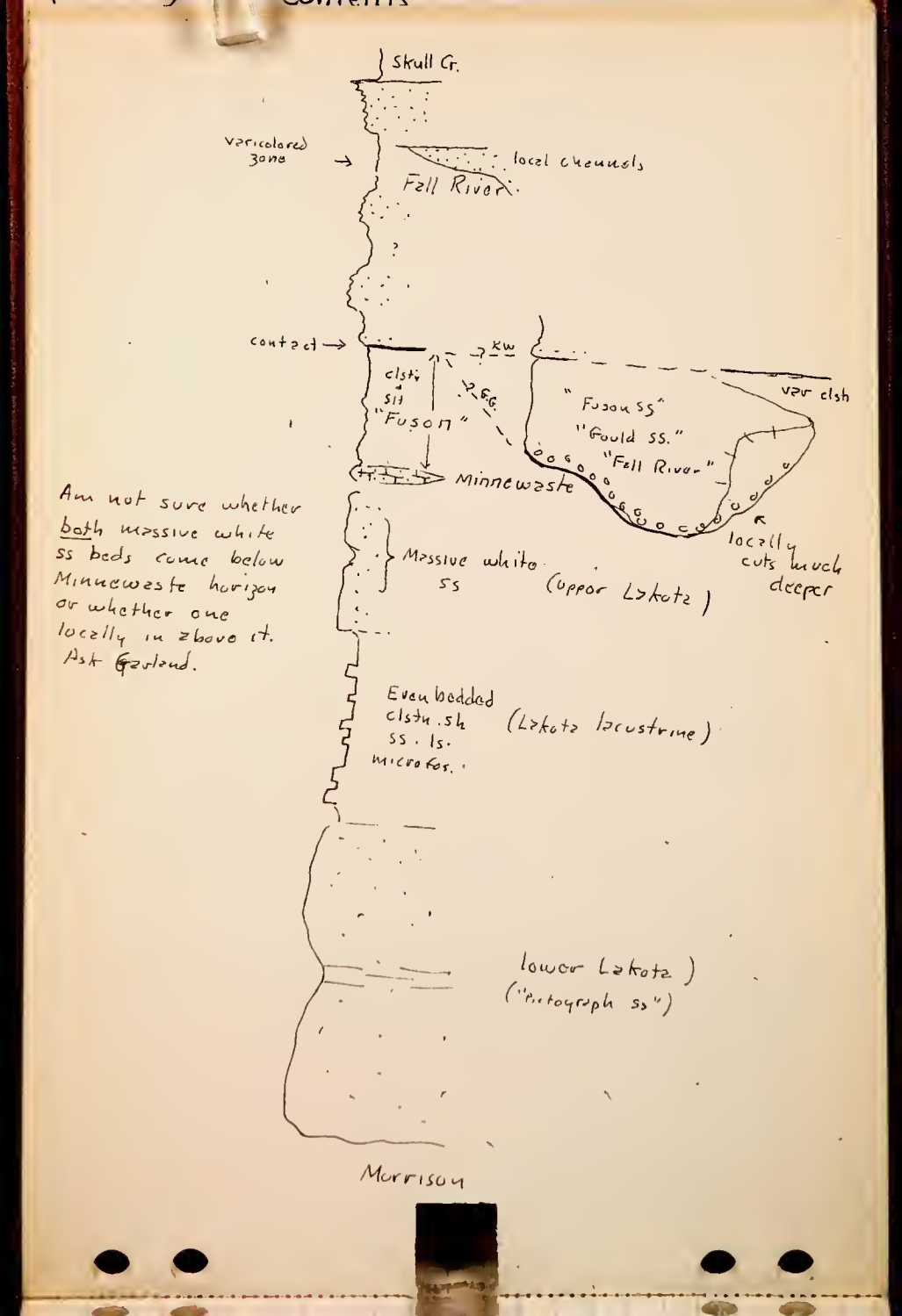
As I understand it "Fuson ss" is additional to these locally.

Lakota - Morrison contact.

Definitely 2 kinds. At C. basal massive brn. Lakota sits on green Morrison clstn section. At K Black shale with carb fragg & some silty lam are in sharp contact with green Morrison clstns below.

Morrison can't be much over 40-60 ft at K but G. says most places over 100 ft.

Generalized section — Best rep. section of Fairlands area is in single face at loc. I on map. This goes from base Lakota into lower Fall River ss. Could prob. get full Fall River incl. Skull Cr. contact in lower Red Canyon near A. In Flint Hill quad. Lakota differs tho lacustrine


Skull Cr.
Varicolored zone
local channels
Fall River
contact
Kw
clsty silt
"Fuson"
"Fuson ss"
"Gould ss."
"Fall River"
very clsh
Minnewaste
Am not sure whether both massive white ss beds come below Minnewaste horizon or whether one locally in above it. Ask Gartland.
Massive white ss
(Upper Lakota)
locally cuts much deeper
Even bedded clsty. sh ss. ls. microfos.
(Lakota lacustrine)
lower Lakota)
("Pictograph ss")
Morrison

beds loc. present. Bell has sent Charophytes + ostracods to Peck. OK'd for Lower Cret. He, Bell has also had fossils in polished pebbles studied by P+S + report says Pennsylvanian - could be Minnekahta or correlative units in Bighorns or Hartville uplift.

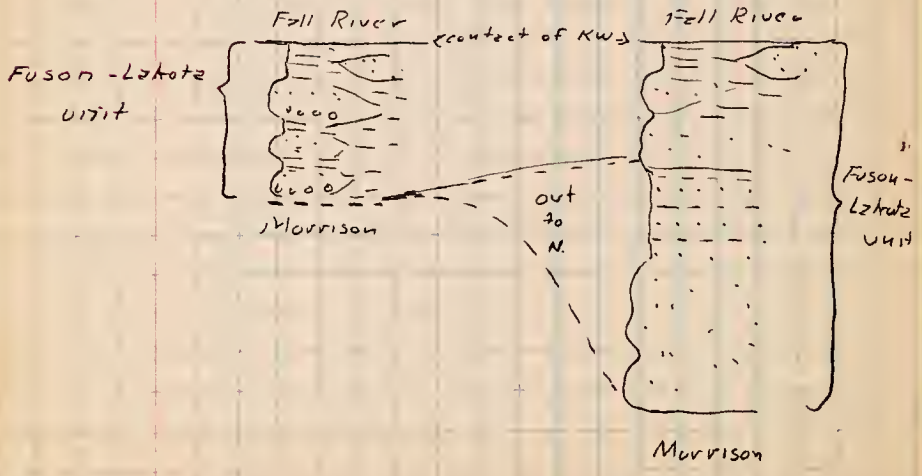
(Might be worth investigating whether these derived from ancestral Rockies - passed to Fountain correlatives - then in Jurassic uplifts to Morrison? and Lakota.) Doubt direct derivation. Crowleys thesis based on gold in Newcastle ss + Lakota coals is also subject to interps. other than one he favors of local derivation of Hills. Inyan Kara (+) from emergent Hills area near Keystone. Gerland mentioned work by Russians on transport + redeposition of gold in solution.)

Approx succession, without regard to thickness, shown above for Gerlands guard.

Possible relation to NW Hills.

Most similarities are in Fall River and upper part Fuson-Lakota, including contact between these units.

Most obvious difference – the southern Fuson-Lakota is markedly finer grained, ~~and~~ obviously much thicker and contains lacustrine beds. Good possibility that southern hills has more Lakota than northern. In D.T. area would guess we had relatively similar but coarser & thicker Fuson-Lakota interval = to southern "Fuson" and massive white upper Lakota, viz.



Possibly the coal-bearing Lakota

In the Aladdin — Sundance — Cambria areas are swamp or marginal lacustrine deposits which may mark local base levelling at about same time as southern lacustrine phase. All coals in question do come under the northern Lakota cgltc ss.

Miscellaneous notes.

At Devils Canyon on Cheyenne R. canyon walls spectacular Inyan Kara exposures showing the great local lateral variation typical of these rocks. Didn't get time for more than a look at this.

W-22 Wyo. Rt. 111 road cut across N. end Bear lodge Mts, chiefly in section 20, T. 54 N., R. 62 W.

Part A. Starting top big ss. in first cuts W crest. & measuring down to break in cut at gulley.

Grass [illegible]

0 53-? [illegible], massive. cross-laminated to [illegible], with local [illegible] lenses of [illegible] light grey [illegible]. A laterally variable unit which is locally almost entirely sandstone but [illegible] thin lenses of ss in grey shale laterally, in upper 15-20' ±. [illegible] 15' ±.

B[illegible] irreg. with small [illegible] 5' [illegible].

N 1.0-5.0 [illegible] gr., massive, grading to siltstone and clayey siltst[illegible] unit [illegible] irreg. bedding in upper [illegible] 5'

part [illegible] weathers graywhite with yellow stain. Locally upper [illegible] part is cut out by channel base overlying unit. About 2' from base is purple-pink zone in siltstone with black, Mn-looking spots and [illegible] blobs. Below this zone which is 0.2± [illegible] color is gray. ± silt clayey. At base is 0.1-0.2 of hard Fe impreg. OB sandy siltstone which sticks out as thin ledge.

M 3.5 Siltstone, shaly, locally approaching [illegible] shale. Brownish gray with purplish cast grading to black. Locally stained [illegible] 1.0± [illegible] [illegible] matter, & scattered [illegible] spots [illegible] [illegible] red [illegible]. The [illegible] looks [illegible] so [illegible] stained up. Basal 0.2-0.3 [illegible] red [illegible] stained pink.)

L 1.0-2.0 Siltstone, more resistant than above, chiefly massive with [illegible] sandy siltstone; x-lam and laminae common with some mixed zones as in above. Chiefly gray with upper 0.4 ± Fe impreg, red weath, which gives whole unit purplish cast. Grades to unit below.

K 4.8 Siltstone and minor clayey silty clay, [illegible] gray to black in middle part. Upper 1.5 ± somewhat lighter, [illegible] [illegible] [illegible], siltier. Middle part is similar to 3.5 unit above, is clayey [illegible] silt that [illegible] been [illegible], and [illegible] red weath. Fe [illegible].

[illegible] Lower [illegible] [illegible] becomes [illegible] part is [illegible] gray [illegible] [illegible] in irreg, [illegible] [illegible] [illegible]. Clayey silt [illegible] [illegible] [illegible] black above. Base 0.1, or less, is red Fe impreg zone on Ss below.

Unit	Thickness	Description
J	2.7	Interbedded thin beds [illegible] ss interbedded with light gray silty shale & siltst. Whole unit highly colored in beds by Fe [illegible], [illegible], [illegible]. Laminated to [illegible], Top 5 bed & some others Fe impreg. Shaly silts splotches pink & yellow [illegible]. Along strike [illegible] [illegible] locally qtz [illegible] [illegible] local ss lens in [illegible]
I	24.4	Thinly interbedded [illegible] sandstone and gray to light gray shale & shaly siltstone. Laminated [illegible] some [illegible] some sands locally massive [illegible]. Fe yellow [illegible] in ss [illegible] [illegible] [illegible] [illegible] [illegible] ss [illegible] 0.5 & under [illegible] [illegible] local lenses. Upper 0.5 [illegible] [illegible] is heavily Fe impreg VB + OB. Basal 2–4 ft [illegible] ss [illegible] [illegible] Fe impreg and basal 0.2± a bed

concretionary ledge. Weathers YB to buff.

This outcrop of this interval broken by gulch but the across is within about 2 or 3 feet at most, short if anything.

(Part B.)

H	3.3	Siltstone, sandy to shaley, grey with irreg black blebs + specs — upper 1.5 ft grn with Fe red stain in irreg blotches. Looking this is a fine gr. Silty SS in upper part. or a silty shale IB. with siltst
G	0.6	Sandstone, fine gr. silty to clayey gray, massive, grades to unit below
F	1.4	Siltstone, lor. sandy + clayey gray to light green gray with red mottling (Fe stain)
E	1.4	Shale, silty at top, very light gray with greenish cast and pink to red. 0.1 of Fe impreg OB silt at top. and 0.1 of red Fe impreg fine gr lam

SS, 0.4 from base. Shale is silt free thruout all but top 0.1 esc

D	0.6	Sandstone, fine qtz, Fe impreg reworked forms local ledge upper 0.1 ± lam. zone Fe cap weathers OR with red tops
C	2.5	Siltstone, loc. shaley gray, soft, mottled pink + with some thin blebs also calc
B	0.8	Siltstone, shaley w/ red band forms local ledge, Fe cap 0.1 Fe impreg.
A	5.0 – ?	Claystone, finely silty v2v, red and gray with Fe specks thruout 3.2 from top red qts brick-orange red, in areas Fe concentrated like red ochre.

Road cutting.

On the east side of the hill the road cuts show channel sands in lower thin-bedded portion of the Fall River. The contact is in similar beds to those on west side with a variecolored zone with white, yellow weath. siltst with plant frags resting on the highly colored (here orange rather than red) zone with Fe. specs.

Cut on E. side of Hill = one with thick orange-colored slope on E. side.

Measuring down from equivalent to unit B. of preceding section.

Part C

-?- Shale pink & gray

0.4 to 0.8 (=Unit B) Siltstone, light gray, weathers with yellow stain, loc. limonitized, has carb frags — incl loc. fern pinnules.

3.0 Siltstone, light gray, massive, shot through with yellow Fe. specks. Loc. clayey, upper 0.8 has yellow stain then, about 2' from top bright orange in irreg areas. Grades in lower foot to unit below

2.3 Clayst.one, silty, gradational from clayey siltst. above Gray with Fe dots, finely silty, irregularly colored by bright orange stain. The Fe specs under base are not yellow or red seem to be unweathered, are brownish gray grain-shaped (Sample 1 in part)

3.4 Siltstone clayey, gray with the scattered 'grains' of Fe, some orange stain (Sample 1 in part) soft

5.0 As above but harder, becoming sandy locally, with Fe specks

2.7 As above, but sandy throughout, and lacks Fe specks. Gray, some yellow stain.

1.4+? Sandstone, med gr at top grading to fine gr + silty below ~~Cuttings~~ at top gray below.

Next cut downhill has ss in upper part but no continuous beds, [illegible] tie-in between cuts.

The preceding section does not even hold for its cut inasmuch as the sand at the base lenses out ~~to~~ toward the east end of the cut and other sands then once came in well up in the Fe-speckled silt zone.

In next cut down, silty ss with carb frags is at top, and similar to ss with carb frags in E end gutter at lowest point preceding cut, [?] feet below where section starts. This ss (in [illegible] cut) is about 7 to 8' thick — Section follows:

Grass roots + wash = upper 3'± of
Pt C (cont.) cut, then trench begins — approx section carrying along cut with level

7.2 Sandstone, fine, med + coarse gr., loc. has lenses gray silty ss., carb frags in large + small chunks which appear water worn. Basal foot is coarse to [illegible] Fe impreg.

5.0± Claystone, gray, silty in upper ½ foot grades abruptly to gray sandy siltstone and on into SS. Lower 1.3± yellow weath. med gr. SS.

11.0± Chiefly SS with interbeds of clayey ~~silty~~ gray sandy siltstone. SS weaths [illegible] to yellowish is fine to mod. lenticular.

1.0–? Dk gray to black plastic claystone ±

[illegible] gutter of cut — wash cut down near corner has dk gray clay on surface, but bentonite-like lite gray clay at top & near base — this cannot be hooked up with last cut.

W-23 Weehinkle divide section, Missouri Buttes quad., cent.± SE¼ SW¼ sec. 28, T 53 N, R. 66 W. Local small bluff on W side gulch trib. to Left Hand drainage

Starts in lower sandstone of Fall River and goes downward with only local offsets on trenches to massive coarse cglt Lakota.

Grass roots

8.0 Sandstone, thin bedded, fine-grained, buff to [illegible] gray. Some shaly ptngs [illegible] foot. [illegible] upper [illegible] with [illegible] Fe impreg[illegible].

1.4 Interbedded, siltstone, silty [illegible] and fine-gr. [illegible]. Weath[illegible] [illegible]

0.9 Siltstone with [illegible] [illegible] black clay [illegible] [illegible] [illegible]

Fall River →
Lakota

2.5 Siltstone, gra[illegible] [illegible] to silty clay [illegible] light gray with yellow stains. [illegible] is very yellow, locally [illegible]. Has [illegible].

5.3 Claystone, plastic, variegated, red, purple, light gray.

5.3 Claystone, light gray, calcareous, silty in part, 0.8, lowest 0.5 argillaceous.

4.0 Siltstone, locally sandy, clayey. Upper 0.8 fairly hard but friable, calcareous throughout, white at top to light gray then grayish gray in basal part.

5.7 Claystone, silty light gray, with thin lenses siltstone and fine gr[illegible] SS + 0.5, at base, Siltst + 0.5, from 1.9 + 2.4 above base, and a somewhat sandy one 1.5 [illegible] from top. Upper foot is clayey argillaceous silt with some selenite.

1.2 Claystone, light gray, [illegible] to subconchoidal, fairly [illegible]

finely silty, with 0.1 layer of grey flint clay at base.

14.0 Sandstone, [illegible], [illegible], fine to coarse grained, some scattered granules chert + qtz in [illegible]. Friable, weathers pinkish brown + [illegible] x-bedded [illegible].

11.7 Sandstone, chiefly med. gr., unconsolidated, continuous with above. Has sparsely scattered chert + qtzite granules + small pebbles.

2.7 Sandstone, clayey [illegible] g, fine + med. gr., locally [illegible] [illegible] clayey, remainder sand + [illegible] [illegible] interval [illegible].

19.6 Sandstone, unconsolidated [illegible] [illegible] [illegible] above, some interbedded [illegible] 5.0 [illegible] [illegible] [illegible] [illegible], lower 3' some [illegible] indurated, basal 0.4 Fe stained [illegible].

3.4	Claystone, dark gray to black, scattered qtz & chert [illegible] granules, & is sandy, basal 0.6± is conglom. sandy claystone. Granules [illegible] toward base.
4.0	[illegible] sandy, light grey, shaly at base, sparsely scattered granules in lower [illegible].
1.8	Claystone, [illegible] grey, grading to gray ss. of unit below. chert & [illegible] granules, scattered.
1.2	[illegible], grey, calc., lower 0.8 is [illegible] [illegible] [illegible], with [illegible] qtz [illegible] & small [illegible]
4.1	Sandstone, medium, [illegible] [illegible], grading to calcite. [illegible] [illegible] gray, pert 0.5± then white-yellow weath with some dark f[illegible] for 0.5, then [illegible] [illegible] [illegible] [illegible]

chert-quartzite pebbly ss. Basal
1.8 unconsol. cht pebble gravel

1.5 Siltstone, gray, grading to fine-gr white ss. Few coarse grains and scattered granules.

0.6 Siltstone, gray, grading to fine grained unconsolid. ss. Few coarse sand grains.

1.7 Sandstone, med gr, unconsol [illegible] [illegible] [illegible] granules + pebbles (to 1/4"), [illegible]

3.4 Clayey Siltstone + silty claystone, gray to brownish [illegible] upper [illegible], light gray [illegible], scattered grains + granules [illegible] [illegible] throughout. [illegible] 2 feet those up to 1/4"+, [illegible] [illegible]

6.[illegible] Sandstone, fine to coarse grained, friable, [illegible] [illegible] [illegible], locally upper part poorly consol. Some [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

but locally sharp [illegible] contact
[illegible]

8.5-? Conglomerate with lenses mid to coarse + cglt ss. Chiefly gray and black chert [illegible] 1/2"± long [illegible] granule size. Ledge former.

(Inserted above the line: + cglt ss)

Slope [illegible] (prob base [illegible] on slope is [illegible] bed.

Laterally, down gully [illegible] lateral change with most pebbles [illegible] [illegible] cglt ledge gets thicker. [illegible] top [illegible] [illegible] [illegible] [illegible] [illegible].

(Inserted above the line: to north)

About 300 ft N a 30± foot ledge of cglt lenses in ss.

W - 24

Breach of Pine Ridge - Oil Butte anticline N. side Keyhole reservoir, in d to W of gulley running E thru. about center SW¼ sec 20, T. 51 N., R 66 W, Carlile quad.

At crest of ledge (approx top) measurement at hand level of ss shows 75' ledge to grass rats below, and 17' platy weath ss above ledge. All of which is Lebo to. Hard massive ledge base not far above green gray Morrison.

Along ridge N of crest ledge broken up by local injection of some of ss channels into softer beds.

In gulley, hand leveling up slope along strike (N 14 W 22 E) it is 16'± from top Lebo to ledge to the contact, and 10.5 ft from contact into lower FR ss, which only creeps out in part locally.

The contact is sharp

1.0-? Black silty shale, lb silt
0.2± Siltstone, gray, x-lam, carb frags

0.4. Claystone light grey, weathers white

0.2 Ferruginous clstn, rusty, full of Fe specs.

1.3 Claystone, locally silty, gray with yellowish cast. Fe specks [illegible] [illegible] [illegible] comp [illegible]

0.3+ Ferruginous clstn, a [illegible] Fe specks

1.0+? Claystone, [illegible] [illegible] light gray and purple, Fe specs in upper half (on't [illegible] seen) give yellow stain.

W-25 Left [illegible] Creek, Missouri Butts Quad. Bluff north road in center S½ NE¼ Sec. 18, T53N, R66W.
(Morrison - Lakota contact + base Morrison here)
Bluff [illegible] locally by Fe indurated remnants ~~[illegible]~~ like a gray chert pebble cgl. Under this is ± 22 feet of [illegible] [illegible] [illegible] [illegible], X [illegible] to [illegible] [illegible] [illegible] which is locally shaly at top. Some of [illegible] [illegible] [illegible]

is between NW + N. in direction of flow.

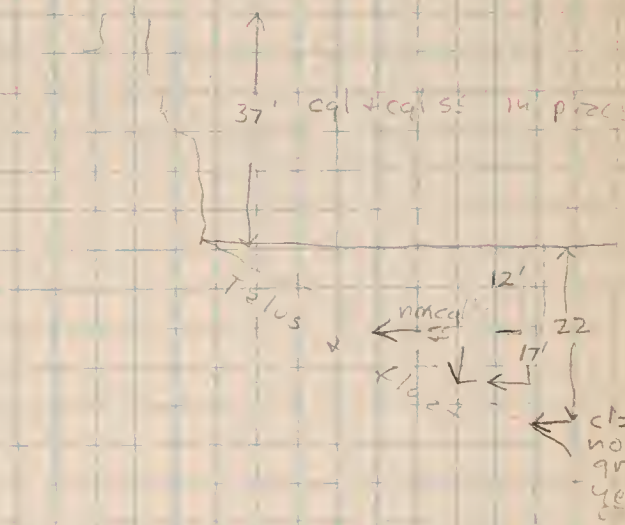
Below this ss was covered bed with slump blocks, from under which float indicating presence of lignite beds. May be possible to dig out the 20 ft [illegible] highest slump blocks but need heavier equipment. Morrison well exposed, some trenching with minor gaps could take it to base as yellow ss present

W-23 Part C

Wecheinkee section – [illegible] [illegible] north to attempt to get better but no luck at C, cyl is 37 ft thick to its talus slope. Just on SE of point is unusual vertical structure with concave bedding. Taken to be a pot hole filling. It is 14-15 feet vertically and up to 2.5 in diam., round in section.

Base of Lakota in question,

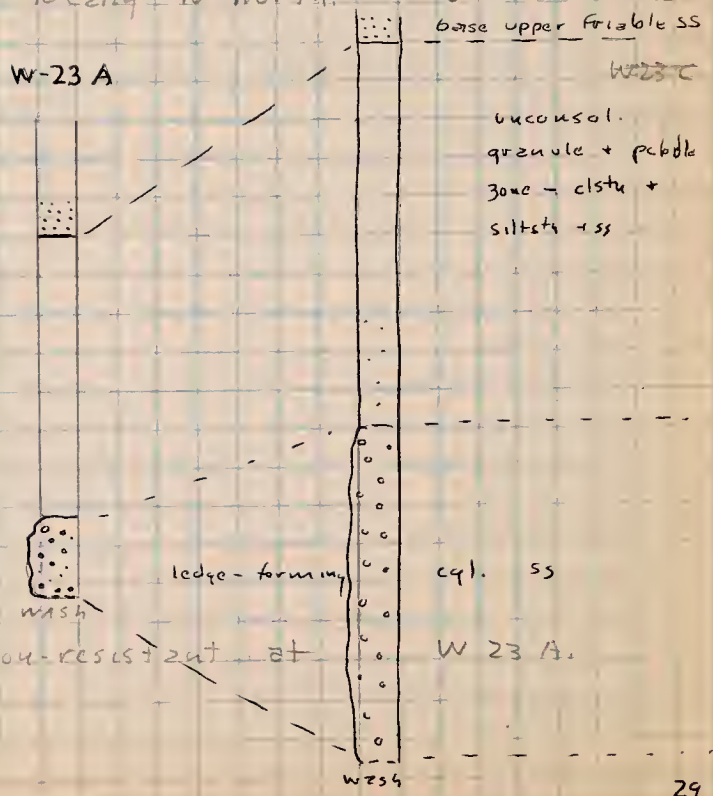
set up as follows



To south up the trench toward where we measured section is prospect pit under cgl ledge. Shows about 2' clay stone, upper foot dk brownish gray lower grades to light gray. This is under a slump block. From top clay to top of ledge in place is 44 ft, so that would bring Zehnder 11 Ac clay in at 44' on the cgl ledge.

W-23 B Just N. W-23 A, on base slope with gravel wash is cap ss which is the base of the 19.6 unit (see p. 21) in Wechinkla section. From here down to base of the cglt ledge it is approx 75' stratigraphically by hand level measurement.

Approx N-S section would show that basal cgl is thickening locally to north.



W-3A. Government Canyon area, bluffs along W side of road connecting with Seely-Algade road in ~~the~~ sec. 18, T. 56 N., R. 64 W. The locality is probably in sec. 31, T. 57 N., R. 64 W., according to Crook Co. road map.

Along the bluff a channel sandstone forms massive ledge for distance of about 300', lensing out into silty to sandy claystones laterally. Ledge is in Lakota, at about same position (15-20 feet) below Fall River contact as the friable ss lens in the Gov't Canyon section.

From sandy clstns, a clstn assoc with the ledge, numerous polished pebbles washing out. Fusulines + other fossils in some of these. Sent to P+S for possible ident. of source. Also included part of stromatoporoid?

Theobalds Fossil Forest on Inyan Kara creek.
Silicified fossil logs coming out of beds which may be either lower Lakota or Morrison. Paul Theobald has section here.

specimen of best structural preservation submitted to P & S branch. This is a critical section if stuff ~~is~~ is undoubted early Cretaceous, can probably be tied in with Inyan Kara #2. Think that a detailed mapping of bluffs E of creek between I.K. #1 and this locality might reveal whether Morrison & Lakota transitional, interfinger laterally, or have an identifiable plane of separation when both are in claystone phase.

Location of fossil wood —

Core samples from A.E.C. Drilling

1. Hulett Creek.

Hole – H.C. 154, box 5

Contact at 133.5 ± is dark gray shaly siltstone with carb frags on a gray white siltstone & sandy siltstone with Fe specs.

Sample 133 – 136.

A. 133–133.4,
B. contact piece
C. 133.2 to 135
D 135 to 136.
E. 136 to 137

2. Poison Creek #3

Contact at 169 ± break between gray lam. siltst and a soft light gray claystone.

A – 168.7 – 169 — [illegible] River & contact
B – 169 – 170 — claystone with Fe blebs.
C – 170 – 172 ±
D – 172 – 173 ±

Unit. This, from 175 down, goes back to [illegible] carb trecks [illegible] to the Fall River

3. Elkhorn Creek #3

Contact at 149.7 ± is carb silt on light gray clay.

A. 149 to 149.7±
B 149.7 to 150.7
C 150.7 to 152.7

In Elkhorn #4 the fallRiver based contact at 146.2, the Morrison upper contact at 385. No coaly zone + base of FR is silts an gray clay with Fe bands (spot sample # A is 146.2 to 146.7

4. Dinky Creek NHR 126

Contact at abt 135 (base muss eq.

A. 0.4 above contact.
B. contact to 1 foot below
C. Spot sample 1½ feet below at the visible Fe spotted [illegible]

5. Bronco John Creek

Contact indefinite, log zero to [illegible]

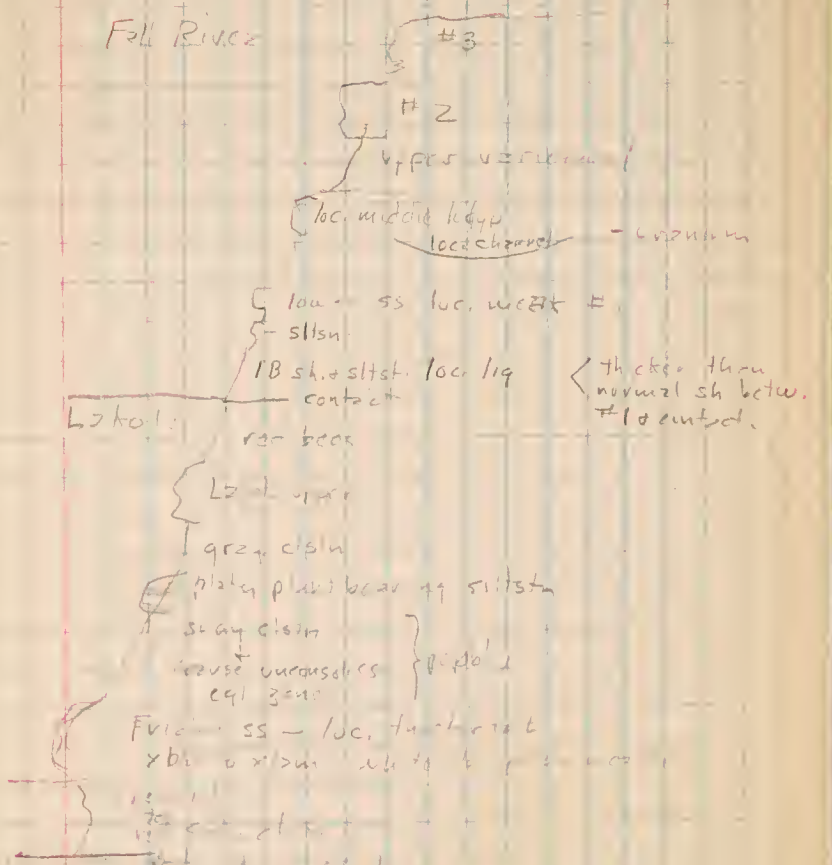
190 – 190.7 Shaly lignite
190.7 - 196 Siltstone, dk gray to gray fissile to stiff, gyps seams [illegible] in upper 4 ft

is dk grey. lower part light grey, [illegible] clayey, less sandy.

196 – 198.4	Light grey clayey siltstone, continuous [illegible] Fe spots begin about 0.2 from top. Is [illegible] sandy.
198.4 – 202.5	Some purple locally. Claystone silty, massive except [illegible] 1.54. Fe spots, light grey to grey [illegible]
202.5 – 206	Arkstone, v. [illegible], grey with [illegible]
206 – 211	Siltstone [illegible] v. [illegible]
Coal, 2.2 [illegible] [illegible] Most [illegible] [illegible] Siltstone	

W-26 Storm Hill Qvzl. with Glenn + Ran

E. end Storm Hill.



A824

W-27 Skull Creek fossil locality on Elkhorn Creek.

In ferruginous conc. layer just E. of road at fork just N of cent. sec. 23, T. 56 N, R. 66 W. Layer is just under a [illegible] sand zone which sheds small [illegible]

W-28

Locality in first bentonite pit N of Bentonite Rd, W. intersection with Atzedze Rd about 1¼ miles

Newcastle bentonite

Top of cut.

I	3.0±	Wash on weathered outcrop of black shale & bentonite
H	1.0	Silty black shale grading ↓ to shaly siltstone locally
G	0.3	Black shale,
F	0.35	Bentonite
E	1.3	Black shale becoming sandy at base with some sandy lig. sh. in bz 0.2
D	4.2	Sandstone, fine gr. silty [illegible] strong current X-lam. on small scale (? ripple mks?)
C	1.5±	Shale black & dk gray at top grading to mottled gray and light gray bentonitic shale

B 4.0± Bentonite, grades into bentonite shale above.

A 0.5-? Lignite, shale, wood fragments. (Wood samples.)

Bottom of pit

W-29 Badlands in Newcastle

Grass roots

7.7 Siltstone, tan-brown, light gray locally fine sand locally, lt. brown zone + brown conc. Fe in sandy zone (0.8±); nodular concretions 5' from top. In basal 1.0 silt grades very more clayey developing grades into hard silty clay then into unit below. About basal 2' massive (+/- less hard).

Top of upper conc. zone weathers locally to rubbly brown sandstone.

0.3 Shale, black, tough, weathers

fissile. Is silty & locally replaced by shaly siltstone

3.3 Bentonite.

0.5-0.8 Lignite & lig sh., some pyrite chunks fossil wood loc.

1.0 Claystone, gray, finely silty plant rootlets, vertical

1.3 Shaly, silty, lignitic & shly lig siltst rootlets remains on bedding loc.

0.8 Claystone gray-dk gray, occas. fossils, selenite

2.8 Claystone, light gray, silty, grading to Siltstone, rootlets (vert), in most of it ~~massive~~ weathers white. massive

0.7 Sandstone, fine gr, silty, loc. CaCO3 cement causes brown weath crumbly lenses. Loc nodules with barite cement + cut. with beds above & below

3.2 Siltstone, massive light

grey, with Fe specs which
locally weath yellow giving
interval splotchy stain.
Is locally clayey (Sample #1)

2.1 Siltstone, grey to light grey, thin bedded, in upper 0.7 which forms obscure shelf loc. Grades to silty shaly; and dark grey shale in lower 0.5, which grades thru bentonitic zone to unit below.

1.3. Bentonite.

1.3 Lignitic silty clstn seams lignite

5.5 Claystone, hard, grey to dk grey + brownish grey. Darker shades in upper 3.0 where carb frags plentiful, chiefly rootlets. This zone may be fair. ref. clay, ~~too~~ but finely silty.
Lower 2.5 is light grey silty clstn with local
(Sample 2) → concents. of Fe blobs
which weath out in irreg
[illegible] Fe clusters or [illegible]

stain crop, yellow in sp. [illegible]

3.0 — Continuous with above — Irreg interbedded + interlam siltstone + claystone, dk gray to brown same seams pure clstn. Chiefly brownish siltstn in lower part. Some of clstn finely lam. Local such ~~[illegible]~~ lenses

2.0 ± — Sandstone + siltstone, locally indurated, brownish on fresh with carb. frags, weathers white to yellowish, friable and spongy. Gets clayey in basal 0.5 — locally lignitic at base

0.8 — Bentonite or bent. sh., greenish gray

Skull Cr. 3.0 — ? — Shale, clay, dk gray to black, 1.7 from top is 0.5 zone with glauconite. (Sample 3)